Security Measures: Effectiveness of the Installation of CCTV Cameras in Relation to Crime Prevention as Perceived by the Community

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ABSTRACT

Closed Circuit Television (CCTV) camera have recently become an indispensable part of daily life. Cameras are of vital importance as significant elements of security systems in different buildings and establishments such as houses, stores, and shopping malls. Also, millions of CCTV cameras are installed in streets with the goal of reducing crimes, preventing crimes, and increasing public safety. Effectiveness of the installation of CCTV cameras in relation to crime prevention aims to determine the effectiveness of CCTV cameras in the selected barangays of Ozamiz City, usefulness in crime prevention with respect to traffic violations, crimes against person and crimes against properties and to propose an action-based plan based on the results of the study. The study utilized descriptive-correlational design, mean and standard deviation was used to analyze the gathered data. Results revealed that the installation of CCTV cameras are very effective in crime prevention as it monitors and records the scenes 24/7 that can help in solving any reported crimes such as theft or robbery incident. Moreover, the installation of CCTV cameras is very useful in crimes against person and crimes against properties as well as in preventing traffic violations because CCTV can be used as evidence in court, and it will help the authorities solve any crimes and when drivers are aware that CCTV are monitoring the roads and traffic, they will adhere to the laws set by the authorities for fear of getting penalized.

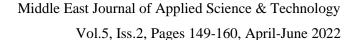*Keywords:* CCTV camera, Effectiveness of CCTV, Crimes, Crime prevention.

1. Introduction

Closed Circuit Television (CCTV) are primarily used to monitor and record images of what takes place in specific locations in real time (Duncan & Piza et al., 2018). CCTV camera surveillance camera systems has been increasingly used around the world during the last three decades. In some countries and areas these systems are pervasive and dense. They serve multiple purposes, such as prevention against thefts in stores, monitoring of traffic or sport events, but crime prevention is particularly prevalent and often justifies CCTV system deployment (Matczak et al., 2019).

The significance of CCTV camera monitoring lies in a person–situation interaction background of criminal behaviour. The environment is not a passive background of criminal behaviour, but it often plays a fundamental role in its initiation and course. Criminal behaviour depends on situational factors (Weisburd, Majmundar & Shariati, 2018), so the distribution of crimes depends on the distribution of spatial conditions of a given type of crime. Crimes are concentrated in places that create opportunities and facilitate their committing.

That is why CCTV camera serves many functions and is widely used in both public and private places. CCTV cameras are video cameras used for the purpose of security and observing a certain area (Fitwi et al., 2021). According to (Corechea et al., 2017) nowadays there is a widespread use of CCTV camera systems in public places, in business, establishments, streets, school, and even along the routes of public highways. The study of Skogan (2019) argued that the proliferation of CCTV should be contextualized in terms of innovations that will shape the future of video surveillance.

A common goal of most CCTV camera system has been the prevention of crime and disorder through deterrence (Cuevas, Corachea & Bautista, 2017). Claims are also made that CCTV cameras provides public reassurance and

therefore reduces fear of crime which occurs anywhere, it also increases the use of public spaces (Cuevas & Corachea, 2017). CCTV cameras has a deterrent effect because offenders are likely calculating the risk and opportunity of committing a certain crime, and the cameras monitoring them causes them to refrain from committing the crime (Piza, 2018).
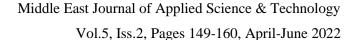
As countries flourish and their economies expand, social concerns become more prevalent, peace and order, as well as people's safety and security, are two major concerns (Cuevas, Corachea & Bautista, 2017). Everyone can see that crimes are present everywhere and that anyone can become a victim of crime, which causes a lot of people to feel terrified (Safeland & Piza et al., 2018). Knowing their responsibilities, governments around the world have implemented a variety of crime-prevention initiatives. The use of CCTV camera is one of these advancements (Piza, Chu & Welsh 2021).

CCTV camera systems are now frequently connected with other types of security systems, examples are license plate readers and linked traffic cameras (Skogan, 2019). And in the context of today's completely complex society, it is very difficult for law enforcement officers to oversee an entire community other than to have a technological advantage (Bowling, 2019). CCTV cameras and other security tools are therefore widely used by them to increase the efficiency of time management and broaden the surveillance coverage (Porter, 2019). In the not-too-distant future, this fast proliferation of technologies aimed at enhancing the impact of CCTV camera will continue (Skogan, 2019). Machine learning advancements may allow for more autonomous video surveillance (Chen, Surette, & Shah, 2020; Idress, Shah, & Sureete, 2018). The study of Skogan (2019) argues that advances in facial recognition software may make CCTV cameras a more central component of criminal investigations, while aerial drones may be routinely employed to offer above surveillance for ongoing events (Kanno-Youngs, 2018).

Progressively, the use of public space CCTV cameras has become a "normal feature of public life" with the daily blanket surveillance of the movement of persons in public spaces (Duncan, 2018). In South Africa, where the police daily fight a deadly war against crime, surveillance technology is increasingly being used by local municipalities to augment an understaffed and under-resourced police force (Moyo, 2019). Increasingly, these cameras are being loaded with 'smart' capabilities, such as Automatic Number Plate Recognition (ANPR) and facial recognition software. The addition of video analysis tools to CCTV surveillance systems has provided additional and refined analysis of collected video footage (Alexandrie & Duncan, 2018).

One of the most pressing queries asked by CCTV's "internationalization" is whether it has a good impact on crime rates in the many public and private settings where it can be used (Thomas et al., 2021). City and town centers, public housing, populated areas, public transportation, parking lots, hospitals, and retail outlets are some of these areas (Thomas et al., 2021). According to a comprehensive and systematic review and meta-analysis of the influence of CCTV cameras on crime, the best current evidence reveals that CCTV camera is linked to a significant though small reduction in crime (Piza et al., 2019). The impact of CCTV cameras on crime varies depending on a variety of circumstances, including the geographical setting, the type of crime, the camera monitoring technique, who is doing the monitoring, the usage of other interventions, and even the nation of origin (Piza et al., 2019).

Throughout the last few decades, the use of CCTV cameras by police and other stability entities has gradually gained (Piza, 2018). CCTV cameras have long been shown to lower crime, but only in specific sorts of crimes and

in specific areas (Piza et al., 2019). Perhaps most significantly, crime reduction impacts from CCTV cameras appear to be most frequent when the cameras are actively monitored and combined with other interventions either police patrols, lighting, or community outreach (Piza et al., 2019). CCTV camera is widely used in stores, gas stations, streets, elevators, laboratories, banks, condominiums, corridors, and privately owned areas in the Philippines (Cuevas, Corachea & Bautista, 2017). Republic Act 10173 known as the Data Privacy Act. Of the Philippines, this protects the fundamental human right of privacy, of communication while ensuring free flow of information to promote innovation and growth. The Boston Marathon Bomber is one of the incidents that a CCTV camera footage was used in solving the crime.

Aguada, formerly Poblacion, is a barangay in the city of Ozamiz, in the province of Misamis Occidental, is advancing due to the increase in the number of facilities, establishments, and highways. It has also embraced the installation and use of CCTV cameras in malls, educational institutions, banks, and intersections and diversion roads to offer coverage in their area of responsibility. Residents, on the other hand, are no longer surprised by its appearance, considering its popularity, effectiveness, and competence as a security measure (Cuevas, Corachea & Bautista, 2017). Police personnel in Ozamiz City, Philippines, utilize them to deter crime and apprehend criminals in the act. Residents help police officers reduce a wide range of criminal offenses.

The researchers as students of the BS Criminology Program, became increasingly interested in exploring all methods to reduce crime with the use of CCTV cameras as it has expanded rapidly since its inception. Due to the increasing number of violations by community members, irregularities of people in the area, several people who conciseness premises and various incidents in events that can be resolved with the help of CCTV camera footage, the researchers decided to conduct the study on CCTV cameras. This research can serve as a basis for future technological developments. In addition, this research focused on the effectiveness of CCTV cameras as a tool for community safety, security, and crime prevention.
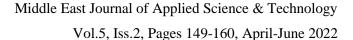
2. Research Methods

2.1. Design

A descriptive type of research was used in the study. Descriptive type of research accurately and systematically describes the responses of the population considered in a particular study. Further, it is a quantitative type of research that describes the effectiveness of Closed-Circuit Television (CCTV) in terms of crime prevention in the urban barangays in Ozamiz City that includes the following: Brgy. Aguada, Brgy. Carmen Annex, and Brgy. Tinago.

2.2. Setting

This study was conducted in the City of Ozamiz. It is a 3rd class componnt city in the province of Misamis Occidental, Philippines. Ozamiz City is known as the historical, cultural and pilgrimage destination in Mindanao and for its agricultural resources and has become a center for Commerce, Health, Transportation and Education. According to the 2020 census, it has a population of 140, 334 people. This study was specifically conducted in the three urban Barangays of Ozamiz City which includes the following: Brgy. Aguada, Brgy. Carmen Annex, and Brgy. Tinago in the province of Misamis Occidental. These three (3) barangays were selected because they belong

to the urban barangays of Ozamiz City, they are center of commerce and with that they are prone for crimes like thief, robbery, etc., and the establishments present in these barangays are utilizing Closed Circuit Television (CCTV) cameras more than other barangays in Ozamiz City.

2.3. Respondents

This study included over-all (30) thirty Barangay Peacekeeping Action Team (BPAT) and the Barangay Local Council as the vital respondents of this study specifically from the (3) three selected urban barangays in Ozamiz City namely the Brgy. Aguada, Brgy. Tinago and Brgy. Carmen Annex and they were randomly selected for this study.

2.4. Instrument

The questionnaire being used for this study was an adapted one from the study of Cuevas, Corachea, Ascabel, Bautista (2016), it was used to gather all the needed data in the study for data analysis. The questionnaire is composed of 40 questions regarding the of effectiveness of CCTV in terms of crime prevention. The researcher's presented a questionnaire to people with expertise in the field for validation. The respondents were asked to answer the questionnaires that the researchers provided, given the assurance that their identifications were kept confidential, and the information gathered were just use for educational attributes.

2.5. Data Gathering Procedure

The data collection was done seriously to obtain reliable information from the identified respondents. Before the conduct of the study with the identified respondents the researcher asked permission from the Dean of the College of Criminology of the University allowing the researcher to pursue the study and to distribute the questioner through a formal letter. Once the approval from the Dean is obtained, the researcher asked permission from the Barangay Captain in Barangay Aguada, Barangay Carmen Annex, and Barangay Tinago in allowing the researcher to identify the respondent. The researcher personally administered the survey questionnaire to the target respondents after receiving permission and setting an appointment with the identified respondents, as well as proposing the day of distribution of the questionnaire. Afterward, the information gathered was recorded, evaluated, and interpreted accordingly and during the survey, the minimum health protocol was also observed.

2.6. Ethical Considerations

The researchers observed ethical procedures in the conduct of the study. Permission was sought from the Barangay Captain in Aguada, Carmen Annex and Tinago, Ozamiz City to allow the researchers to administer the survey questionnaire to the Barangay Tanod and Barangay Officials. The researcher place in the questionnaire that the data gathered by the study would be kept with utmost confidentiality to adhere the data privacy law of the republic of the Philippines. Any communication relating to the research was conducted in an honest transparent manner, and any types of misleading information, as well as biased representation of primary data findings, were avoided. Thus, no harm was brought to the participants mentally, emotionally, and physically, regarding the conduct of the study. Both the researcher and the respondent followed the minimum health protocol.

2.7. Statistical Treatment of Data

The following statistical tool was used in the study:

Mean and standard deviation was used in determining the Effectiveness of Closed-Circuit Television, Usefulness of CCTV Cameras in Crime Against Persons, Usefulness of CCTV Cameras in Crimes Against Property, and Usefulness of CCTV Cameras in Preventing Traffic Violation.

3. Results and Discussion

Table 1 presents the average weighted mean and interpretation of effectiveness of CCTV cameras as perceived by the selected BPAT members and Council of Barangay Aguada, Barangay Carmen Annex, and Barangay Tinago, Ozamiz City. The study revealed that CCTV is very effective based on the general weighted mean of 4.67 with general remarks of "Very Effective" looking into the details of the result, it showed that the installation of CCTV cameras is considered a low-cost method of keeping the administrator's eye on the security of its people and establishments since it yields the highest weighted mean of (M=5.0; SD=0.15) with the remarks of "Very Effective" and as supported by Lawson, T., Rogerson, R., & Barnacle, M. (2018) in their study entitled "A comparison between the cost-effectiveness of CCTV and improved street lighting as a means of crime reduction." Furthermore, it means that owners of different establishments in Ozamiz City feel safe and secure knowing they have installed Closed Circuit Television cameras in their establishments which record everything 24/7, and CCTV cameras save manpower.

On the other hand, CCTV cameras can also lessen the opportunity of the violators to commit illegal violations, got the lowest weighted mean but still in the continuum (M=4.53; SD=0.15) with the remarks of "Very Effective." As CCTV cameras cause hesitation among potential offenders and knowing it records everything, it gives violators an anxious feeling or the feeling of being easily caught, and it increases the risk of detection and based on the concept of (Welsh & Faringeton) CCTV camera has a significant desirable effect on crime.

According to the Rational Choice Theory by (Cornish and Clarke, 1986) which states that offenders are believed to be less likely to commit a crime if they are aware that they are being observed and face a more danger of being captured with the use of CCTV cameras; this will have a greater impact towards crime prevention. This implies that CCTV cameras effectively prevent crimes in the selected three (3) urban barangays of Ozamiz City. It enhances the security measures of every establishment with their presence, and it has a deterrent effect on the offenders. Therefore, it will be a great help for the authorities.

Table 1. Effectiveness of CCTV Camera

Statements	AWM	I
1. CCTV deters crime and help reducing violations that can be committed.	4.77	VE
2. CCTV records the scenes that can help in solving the reported theft or robbery incident.	4.73	VE
3. CCTV eliminates the opportunity of the violators to do violations.	4.47	VE
4. CCTV saves manpower to the security guards on duty for patrolling the school premises.	4.77	VE

5. CCTV saved footage that can help solve the incidence of misbehavior.	4.63	VE
6. CCTV helps to solve vandalism and malicious mischief within the institution or establishments.	4.63	VE
7. CCTV can also capture the individuals that will leave the vicinity earlier than indicated time of leave.	4.53	VE
8. The installation of CCTV cameras is considered as a low-cost method of keeping the administrators eye on security of its people and establishments.	5.0	VE
9. It can also lessen the opportunity of the violators to do illegal violations.	4.45	VE
10. Records the scenes that can help in solving the reported theft or robbery incident.	4.73	VE
General Weighted Mean	4.67	VE

Table 2 presents the average weighted mean and interpretation of the usefulness of CCTV cameras in crimes against the person as perceived by the selected BPAT members and Council of Barangay Aguada, Barangay Carmen Annex, and Barangay Tinago, Ozamiz City. The study revealed that CCTV camera is very useful in crimes against a person based on the general weighted mean of 4.58 with the general remarks of "Very Effective" looking into the details of the result, it showed that the presence of CCTV serves as a tool to identify the strategies used by the perpetrator in committing the act.

Since it yields the highest mean (M=4.8; SD=0.12) with the remarks of "Very Effective" and as supported by Pande, V., Samant, V., & Nair, S. (2016) in their study entitled "Crime Pattern Detection Using Data Mining," CCTV camera is indeed very crucial in investigations into certain crimes because it helps the authorities of Ozamiz City determine the modus operandi of the perpetrators. CCTV camera increases the risk of detection for criminal behavior; they can assist in identifying who was involved in a crime, as when a suspect is recognized by someone viewing the recording. In addition, a CCTV camera is useful in corroborating other evidence, such as witness testimony. CCTV recordings also provide information that investigators can use to contextualize other evidence.

On the other hand, CCTV camera helps to distinguish other persons who may have served as accomplices to the crime. There is a feeling of safety among individuals who stay in areas with CCTV, which got the lowest weighted mean but is still in the continuum (M=4.43; SD=0.12) with the remarks of "Very Effective." CCTV cameras can distinguish persons who may have served as accomplices to the crime. CCTV cameras record the scene 24/7, which means that the offender will be recorded as those surrounding, passing by, and the bystanders.

CCTV cameras can assist in determining whether that certain person has any knowledge or participation in the crime. And as supported by the concept of Ashby (2017), CCTV camera provides useful evidence for the commission of the crime as it records the footage that can be helpful for the investigation, which can increase the risk of detection of the offenders. According to the Situational Crime Prevention Theory (Eck & Clarke, 2019), CCTV cameras in the environment will serve as a strategic change in the establishment; this will deter the future

offender from committing crimes. It implies that CCTV cameras are of big help to Ozamiz City's authorities in solving crimes. It gives them information about the offender and the crime that has occurred, and the information gathered is crucial and a big help for their investigations.

Table 2. Usefulness of CCTV Cameras in Crimes Against Persons

Statements	AWM	I
1. The use of CCTV camera helps locate suspicious character in the streets.	4.53	VE
2. The use of CCTV camera reduces crimes and criminals.	4.53	VE
3. The CCTV camera is used to apprehend the criminals.	4.47	VE
4. Thru CCTV camera the officers can monitor the action of the perpetrators.	4.67	VE
5. CCTV camera helps the police investigator in solving crime by providing lead.	4.67	VE
6. The presence of CCTV camera mitigates riding in tandem incident.	4.53	VE
7. The CCTV serves as a tool to identify the strategies used by the perpetrator in committing the act.	4.8	VE
8. The CCTV camera helps to distinguish other persons who may have serve as accomplice to the crime.	4.43	VE
9. There is a feeling of safety among individuals who stay in areas where there is CCTV.	4.43	VE
10. The CCTV camera reduces tendency of a criminal to personally attack a stranger on the streets.	4.77	VE
General Weighted Mean	4.58	VE

Table 3 presents the average weighted mean and interpretation of the usefulness of CCTV cameras in crimes against property as perceived by the selected BPAT members and Council of Barangay Aguada, Barangay Carmen Annex, and Barangay Tinago, Ozamiz City. The study revealed that CCTV camera is very useful in crimes against property based on the general weighted mean of 4.68 with the general remarks of "Very Effective" looking into the details of the result, it showed that the CCTV camera aids in monitoring banks, malls or another establishment since it yields the highest weighted mean (M=4.77; SD=0.06) it is also supported by Baillie, M. (2019) in his study entitled "Behind the Camera." CCTV cameras help monitor different establishments 24/7 because scenes are recorded at a specific time, duration, and location. Installing CCTV cameras serves as a strong deterrent and makes your workplace a safer place to work, but they can also ensure that any illegal acts are caught in the act. CCTV camera helps prevent crimes and break-ins, and it deters theft in establishments.

On the other hand, CCTV cameras prevent theft in broad daylight with the lowest weighted mean but are still in the continuum (M=4.53; SD=0.06) with "Very Effective" remarks. As CCTV cameras record 24/7, criminals are more

likely to be caught during daylight as their appearance is clearer, there will be a lot of witnesses during the day, and more information about the offender will be seen in the footage. Therefore, and as supported by Francis et al. (2017), practicing crime prevention can achieve safer communities by utilizing CCTV cameras in every establishment, as CCTV cameras can enhance the security measures of any establishment. According to the Situational Crime Prevention Theory of (Eck & Clarke, 2019) which states, that can deter crimes by making strategic changes to an environment, like installing CCTV cameras, technologies such as alarms, electric fences, and other interventions in the establishments to limit the opportunities for future offenders. It implies that the installation of CCTV cameras will surely enhance the overall security measures of any establishments in the selected barangays of Ozamiz City.

Table 3. Usefulness of CCTV Cameras in Crimes Against Property

Statements	AWM	I
1. The CCTV aids in monitoring banks, malls or another establishment.	4.77	VE
2. The CCTV guards and secure properties against criminal tendencies.	4.7	VE
3. The presence of CCTV reduces property related crime.	4.6	VE
4. Reduce theft of motor vehicles and some other forms of acquisitive crimes in areas where there are CCTV cameras.	4.7	VE
5. Secures the properties where the CCTV is located.	4.7	VE
6. The CCTV distinguishes the items taken by the criminals or thieves.	4.6	VE
7. The CCTV records the position of the property and where and how they were stolen.	4.73	VE
8. The installation of CCTV serves as a barrier for the possible offenders.	4.67	VE
9. Monitors the incoming and outgoing individuals from the establishment through the CCTV.	4.7	VE
10. The CCTV prevents theft in broad daylight.	4.57	VE
General Weighted Mean	4.68	VE

Table 4 presents the average weighted mean and interpretation of the usefulness of CCTV cameras in preventing traffic violations as perceived by the selected BPAT members and Council of Barangay Aguada, Barangay Carmen Annex, and Barangay Tinago, Ozamiz City. The study revealed that CCTV camera is very useful in terms of preventing traffic violations based on the weighted mean of 4.63 with the general remarks of "Very Effective" looking into the details of the result, it showed that the CCTV camera aids in identifying traffic violators on traffic rules and CCTV camera also helps the police investigators in solving vehicular accidents. Since it yields the highest weighted mean (M=4.73; SD=0.06) and as supported by Goyal, A. et al., (2022) in their study entitled "Detecting, Tracking and Counting Motorcycle Rider Traffic Violations on Unconstrained Roads."

CCTV cameras play an important part in road network management; they are installed at sensitive locations to support traffic management, where congestion and traffic queues are frequent, and at other locations with an

increased risk of accidents and traffic incidents. Some CCTV cameras have a wider angle and have zoom capabilities that can cover large areas, which saves manpower, and this is a big help to the authorities. As CCTV camera records everything that takes place within a certain area, it will be easier for authorities to know and have evidence of the nature of violations committed by drivers; it can help the authorities gather information regarding the profile of the offender in crimes such as hit and run incidents, etc.

On the other hand, CCTV cameras prevent traffic violation in a certain area where CCTVs are installed, documents the everyday routine of traffic, and CCTV cameras serves as evidence for an offense committed got the lowest weighted mean but still in the continuum (M=4.57; SD=0.06) with the remarks of "Very Effective." As drivers become aware that a CCTV camera is installed, they will obey more traffic rules and regulations due to fear of being sanctioned. As CCTV cameras document the everyday routine of traffic, it will help the authorities provide evidence of guilt of the traffic violators, and it will deem easier to track the violators. The conclusion is supported by the concept of (Dowling et al., 2019), who states that police use CCTV camera footage in a criminal investigation as it aids the authorities in detecting and arresting suspected criminals.

According to Situational Crime Prevention Theory (Eck & Clarke, 2019) and Rational Choice Theory (Cornish and Clarke, 1986), CCTV cameras Will minimize traffic disturbances and crimes on the highway because they will regularly monitor traffic flow. As it will dissuade drivers from breaking any rules because they are more likely to be detected, installing CCTV cameras will help the authorities of Ozamiz City identify violators through the footage recorded. Therefore, it will lessen the opportunity for future offenders and violators. It implies that CCTV cameras effectively prevent traffic violations in Ozamiz City. They will greatly help the authorities monitor the traffic well. The CCTV camera footage will greatly assist the authorities if a criminal incident, traffic violations, or even when an accident occurs.

Table 4. Usefulness of CCTV Cameras in Preventing Traffic Violation

Statements	AWM	I
1. Prevent traffic violation in a certain area where CCTV 's are installed.	4.57	VE
2. CCTV cameras identifies violators on traffic rules.	4.6	VE
3. CCTV camera monitors traffic violation.	4.73	VE
4. CCTV helps the police investigators in solving vehicular accidents.	4.73	VE
5. Proves one 's offense against traffic rules.	4.6	VE
6. Documents the everyday routine of traffic.	4.57	VE
7. CCTV cameras act as monitoring device in major roads.	4.6	VE
8. CCTV prevents crimes on streets.	4.63	VE
9. CCTV records the exact nature of violation or accidents.	4.7	VE
10. CCTV cameras serves as evidence for an offense committed.	4.57	VE
General Weighted Mean	4.63	VE

4. Conclusions

Based on the study's findings, installing CCTV cameras in every establishment and public area is very effective and needed in keeping the properties and the people in the locality protected against future crimes and violations. CCTV cameras play a significant role in preventing crimes by warning criminals that their unlawful activity will be recorded. CCTV cameras are highly effective in crime prevention, as CCTV cameras are useful to prevent traffic violations, crimes against property, and crimes against the person.

5. Recommendations

Based on the findings and conclusion of the study, the researchers encourage all the establishments to have their CCTV cameras to ensure full protection and security to their properties and their lives. The researchers also recommend maintaining this high percentage result of the data gathered, that the city government should consider assigning security personnel or any trusted individual to monitor CCTV operation day and night to ensure prompt response in case of crime or violation detection, as well as security guards working alongside or as a complementary intervention to the CCTV. Furthermore, private and commercial establishments may seek the assistance of professional people engaged in CCTV operation for appropriate CCTV types and areas of replacement to ensure effective and efficient function.

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